Enterprise Agile IT Requirements Management

Defense Acquisition University Alumni Association (DAUAA) Symposium
04/08/2014

Learn. Perform. Succeed.

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What is Agility?

- **“The speed of operations within an organization and speed in responding to customers (reduced cycle times)” (Mass. Inst. Tech.)**

Agile Manifesto

- **The foundational document for Agile software development**

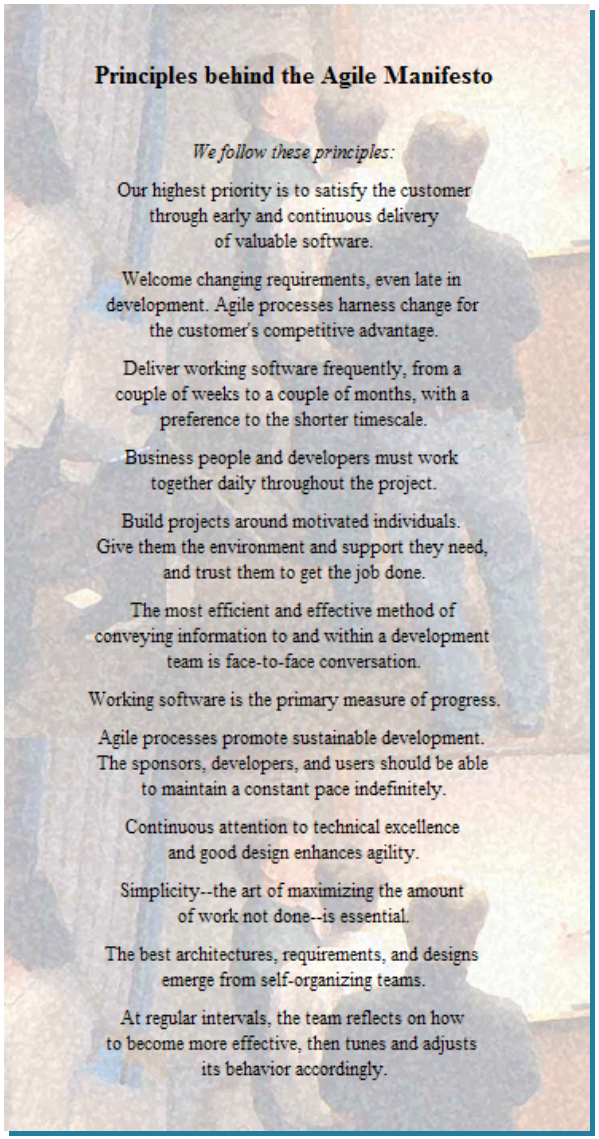
Manifesto for Agile Software Development
We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:
Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan
That is, while there is value in the items on the right, we value the items on the left more.
Kent Beck
Mike Beedle
Arie van Bennekum
Alistair Cockburn
Ward Cunningham
Martin Fowler
James Grenning
Jim Highsmith
Andrew Hunt
Ron Jeffries
Jon Kern
Brian Marick
Robert C. Martin
Steve Mellor
Ken Schwaber
Jeff Sutherland
Dave Thomas

- **Signed by 17 software developers in Feb 2001**

- **Core Values**
  - **Individuals and interactions** over processes and tools
  - **Working software** over comprehensive documentation
  - **Customer collaboration** over contract negotiation

http://agilemanifesto.org

12 Principles of the Agile Manifesto


Principles behind the Agile Manifesto
We follow these principles:
Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
Business people and developers must work together daily throughout the project.
Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
Working software is the primary measure of progress.
Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
Continuous attention to technical excellence and good design enhances agility.
Simplicity--the art of maximizing the amount of work not done--is essential.
The best architectures, requirements, and designs emerge from self-organizing teams.
At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

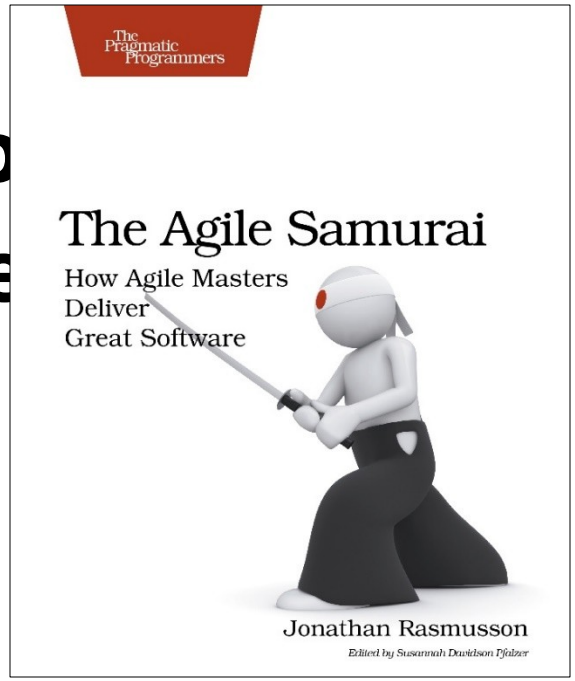
1. **Continuous delivery of valuable software**
2. **Welcome changing requirements**
3. **Deliver working software in weeks/months**
4. **Work together daily**
5. **Build projects around motivated individuals**
6. **Face-to-face conversation**
7. **Working software is the measure of progress**
8. **Promote sustainable development**
9. **Good design enhances agility**

http://agilemanifesto.org

What do they Mean?

Three+ Requirement Truths

1. You can’t gather all the requirements up front
2. The requirements you do gather will change
3. There is always more time and money will allo
4. Your estimates will be



* Added to the Agile Samurai Truths

Your Estimates Will Be Off

Software "Research" and Development

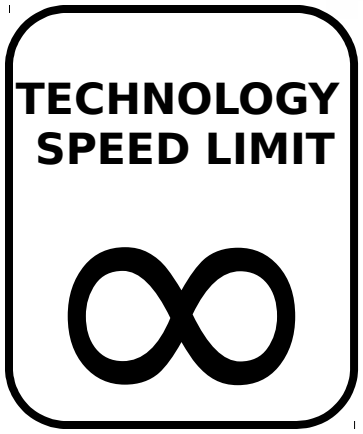
Knowledge Work

Then

VS

Now

Increased Complexity



Example Operational Requirement

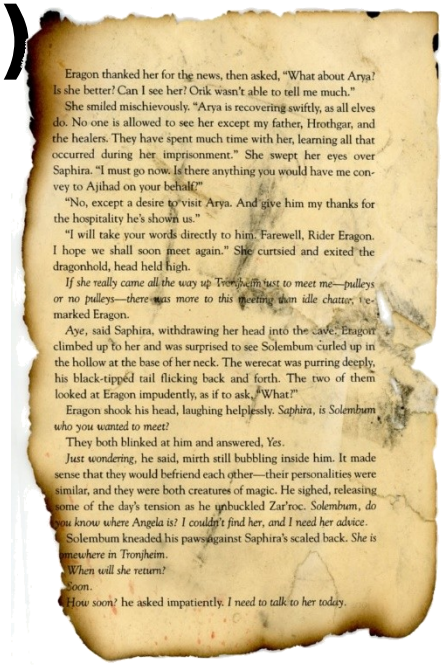
Create an exact hand written copy of 300 pages from a historical book!

How much will this cost?

- **Assumptions**
  - **Section text is double-spaced, left-aligned, and set in a 12-point Courier font.**
  - **The first line of a paragraph is indented one half inch, or 5 characters, from the margin.**
  - **The margins are set so that there are 25 lines per page, with each line having a maximum of 60 characters.**
  - **Sixty characters per line at an**

It's Math – It has to be Accurate, Right?

- **FORMULA: (# lines per page) x (# words per line) = words per page**
- **25 x 10 = 250 words per page!**
- **300 (Pages) x 250 (Words) = 75,000 words to copy!**



Eragon thanked her for the news, then asked, "What about Arya? Is she better? Can I see her? Orik wasn't able to tell me much."

She smiled mischievously. "Arya is recovering swiftly, as all elves do. No one is allowed to see her except my father, Hrothgar, and the healers. They have spent much time with her, learning all that occurred during her imprisonment." She swept her eyes over Saphira. "I must go now. Is there anything you would have me convey to Ajihad on your behalf?"

"No, except a desire to visit Arya. And give him my thanks for the hospitality he's shown us."

"I will take your words directly to him. Farewell, Rider Eragon. I hope we shall soon meet again." She curtsied and exited the dragonhold, head held high.

If she really came all the way up Tronjheim just to meet me—pulleys or no pulleys—there was more to this meeting than idle chatter, remarked Eragon.

Aye, said Saphira, withdrawing her head into the cave. Eragon climbed up to her and was surprised to see Solembum curled up in the hollow at the base of her neck. The werecat was purring deeply, his black-tipped tail flicking back and forth. The two of them looked at Eragon impudently, as if to ask, "What?"

Eragon shook his head, laughing helplessly. *Saphira, is Solembum who you wanted to meet?*

They both blinked at him and answered, *Yes.*

Just wondering, he said, mirth still bubbling inside him. It made sense that they would befriend each other—their personalities were similar, and they were both creatures of magic. He sighed, releasing some of the day's tension as he unbuckled Zar'roc. *Solembum, do you know where Angela is? I couldn't find her, and I need her advice.*

Solembum kneaded his paws against Saphira's scaled back. *She is somewhere in Tronjheim.*

When will she return?

Soon.

How soon? he asked impatiently. *I need to talk to her today.*

“Parametric” Words Per Minute Estimate

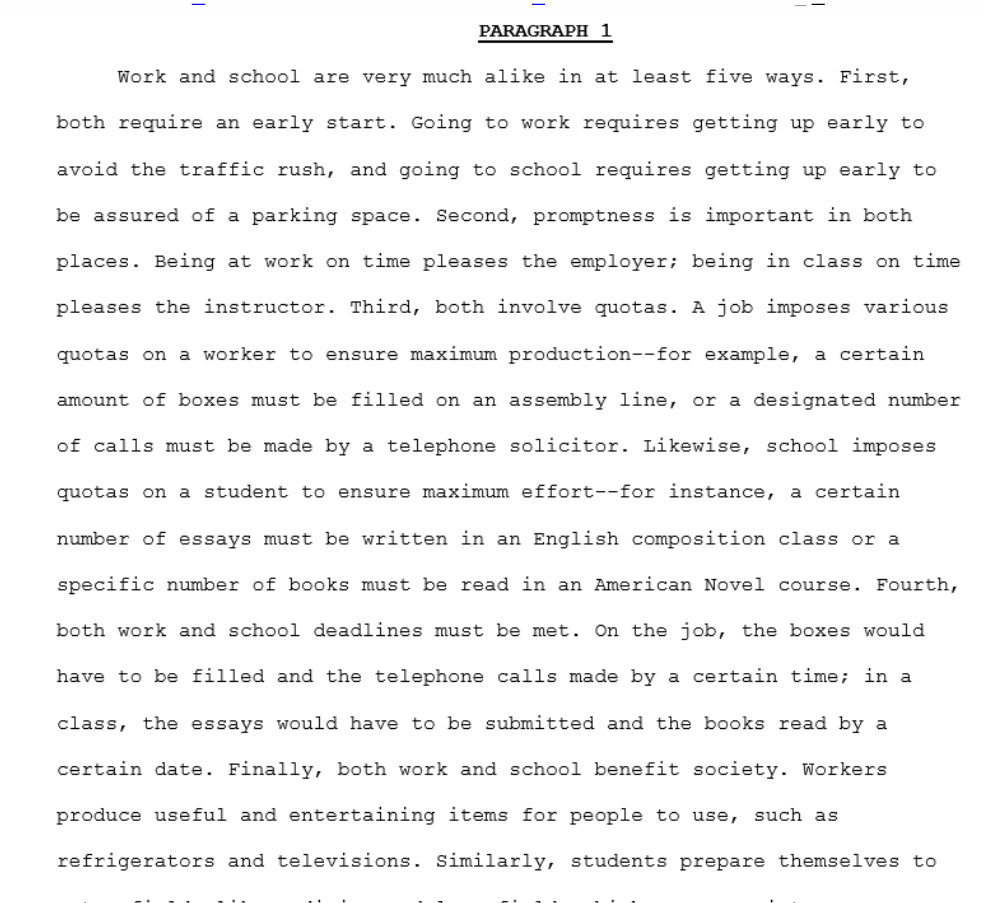
- The average human being hand-writes 22 words per minute while copying.*
  - 75,000 (total words) / 22 (words per minute) = 3,409 minutes to copy 300 pages
- 3,409 (total minutes) / 480 (minutes in an 8-hour day) = 7.1 Days (assuming 1 perso

How many words could you copy in 1-minute?

*Brown, C. M. (1988). Human-computer interface design guidelines. Norwood, NJ: Ablex Publishing.

Experiment

- Given a typed paragraph I asked 28 IT Professionals to estimate how many could copy



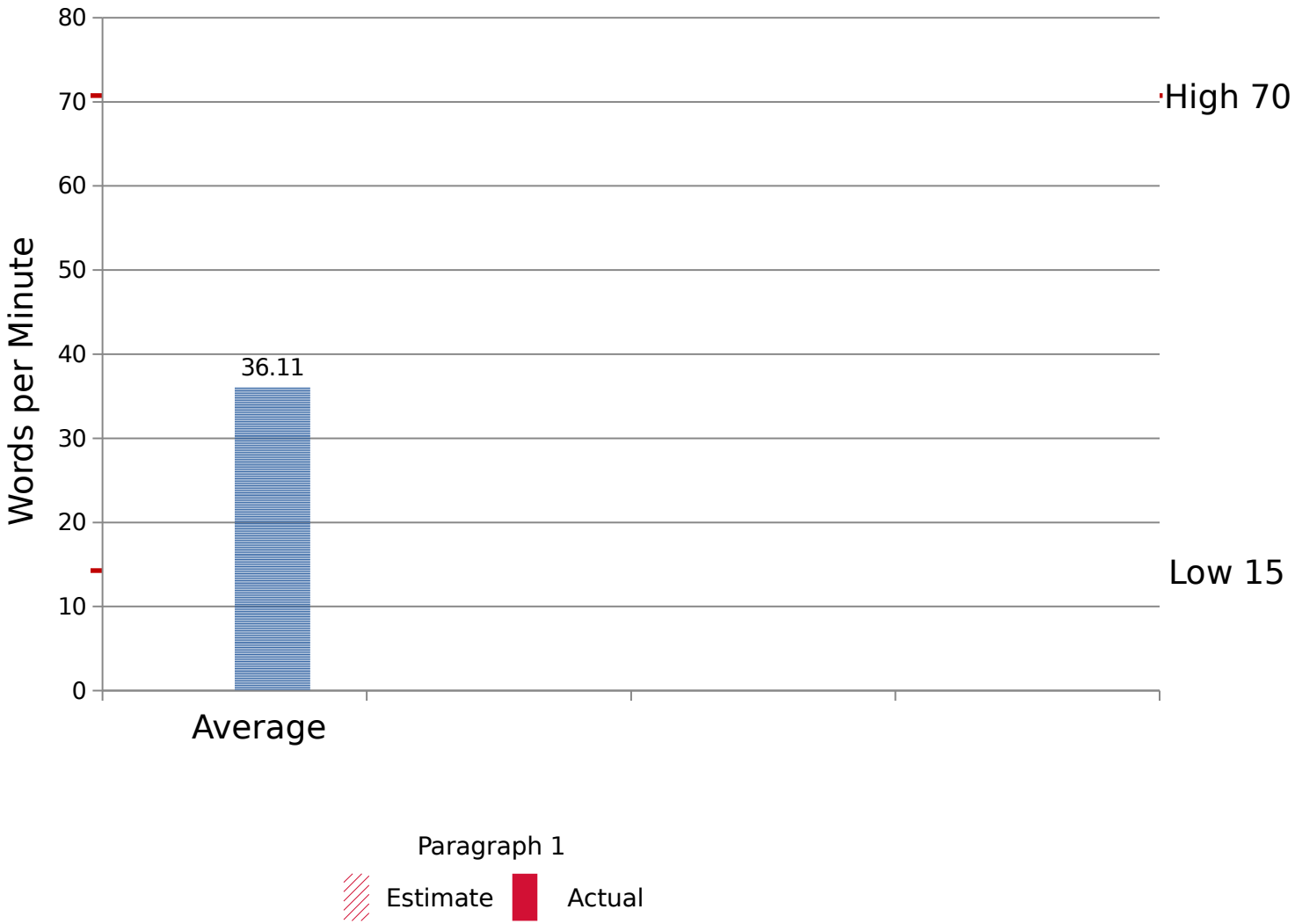
PARAGRAPH 1

Work and school are very much alike in at least five ways. First, both require an early start. Going to work requires getting up early to avoid the traffic rush, and going to school requires getting up early to be assured of a parking space. Second, promptness is important in both places. Being at work on time pleases the employer; being in class on time pleases the instructor. Third, both involve quotas. A job imposes various quotas on a worker to ensure maximum production--for example, a certain amount of boxes must be filled on an assembly line, or a designated number of calls must be made by a telephone solicitor. Likewise, school imposes quotas on a student to ensure maximum effort--for instance, a certain number of essays must be written in an English composition class or a specific number of books must be read in an American Novel course. Fourth, both work and school deadlines must be met. On the job, the boxes would have to be filled and the telephone calls made by a certain time; in a class, the essays would have to be submitted and the books read by a certain date. Finally, both work and school benefit society. Workers produce useful and entertaining items for people to use, such as refrigerators and televisions. Similarly, students prepare themselves to enter fields like medicine and law, fields which serve society.

The Numbers

- **28 Subject Matter Experts**
  - **Total 1,127 Years of Experience**
  - **Average 40.25 years of Experience**

Results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Words per Minute
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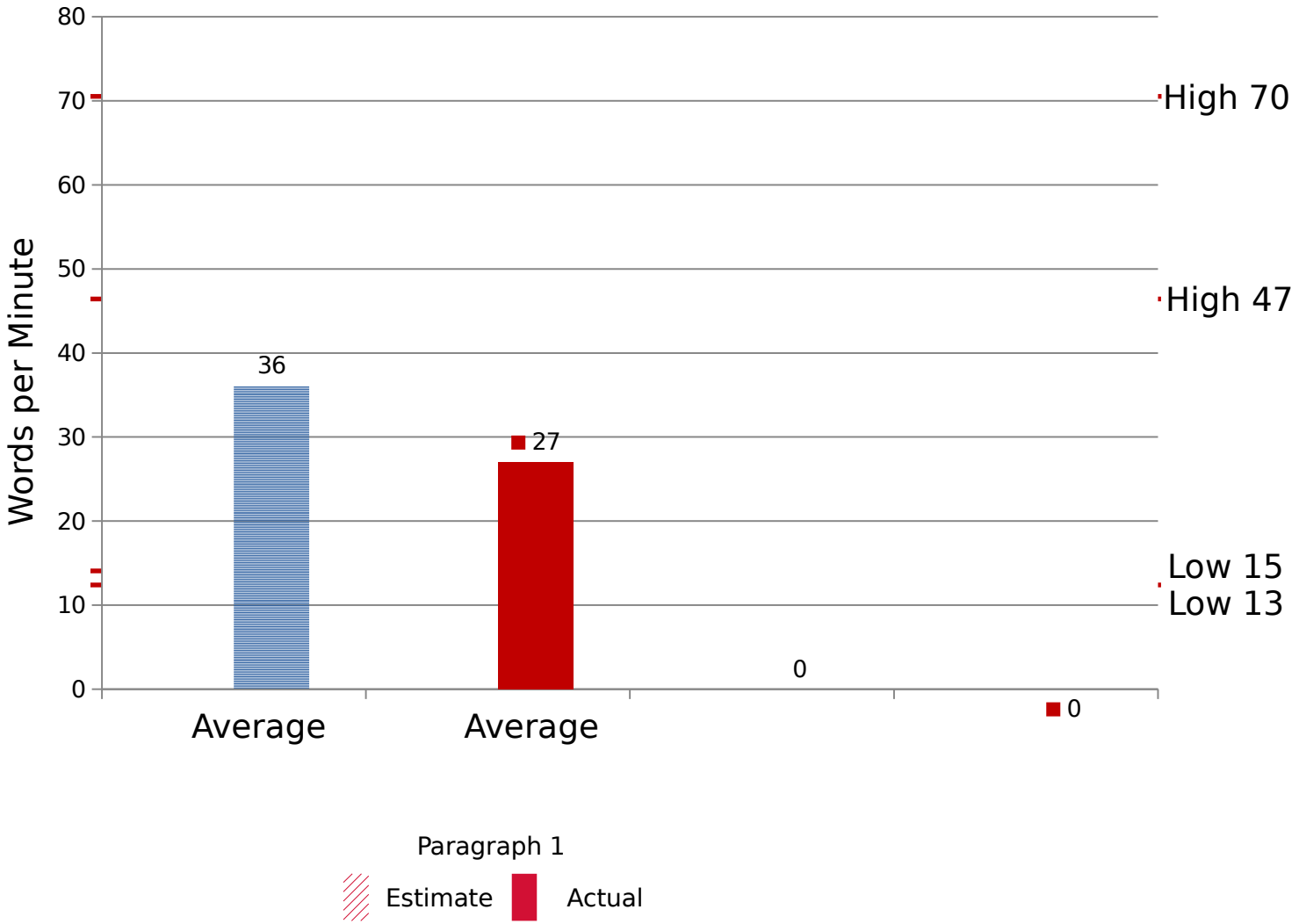
High 70
Low 15
Average
Paragraph 1
Estimate
Actual

Results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Words per Minute
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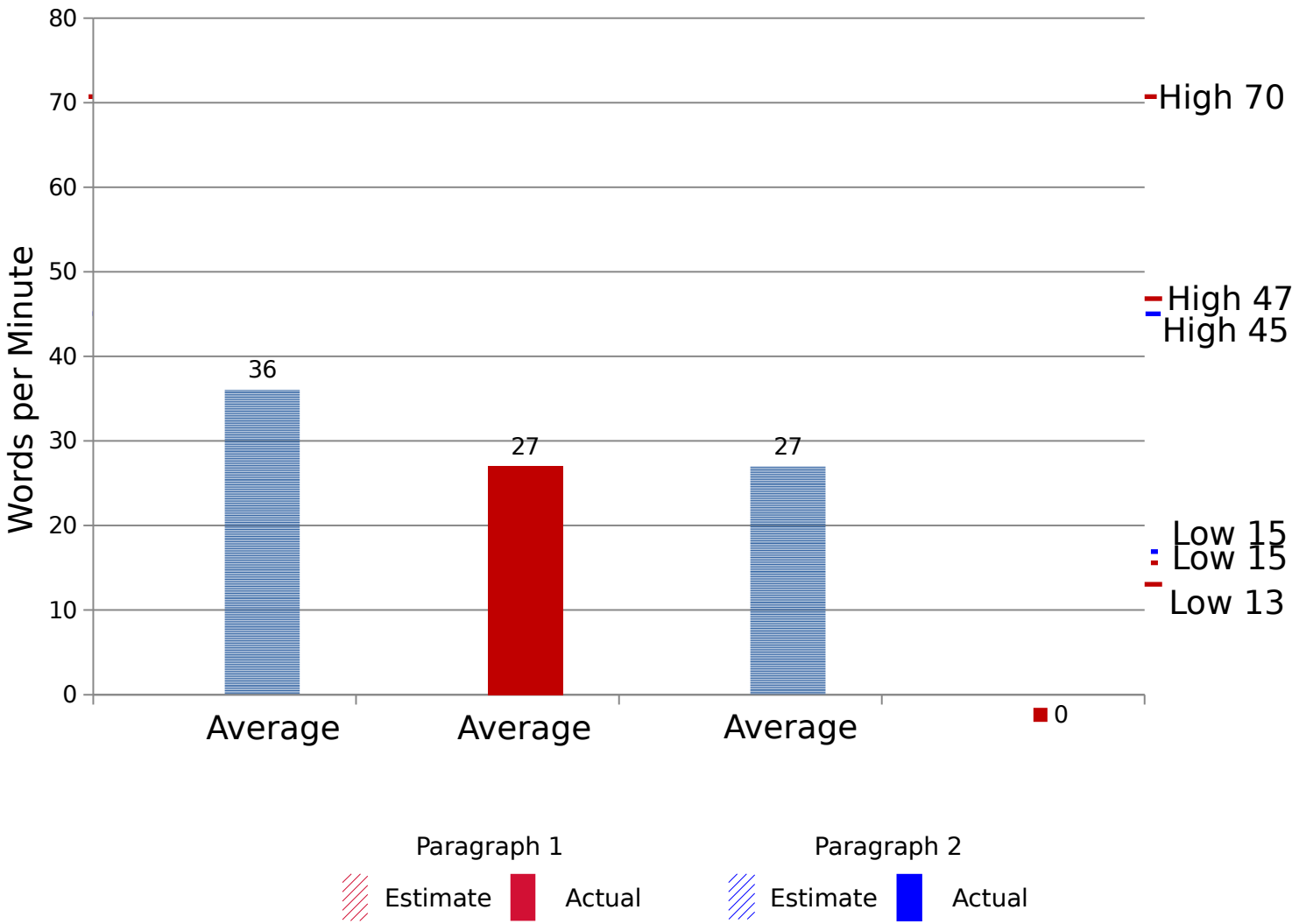
Average
Paragraph 1
Estimate
Actual

Results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Paragraph 2
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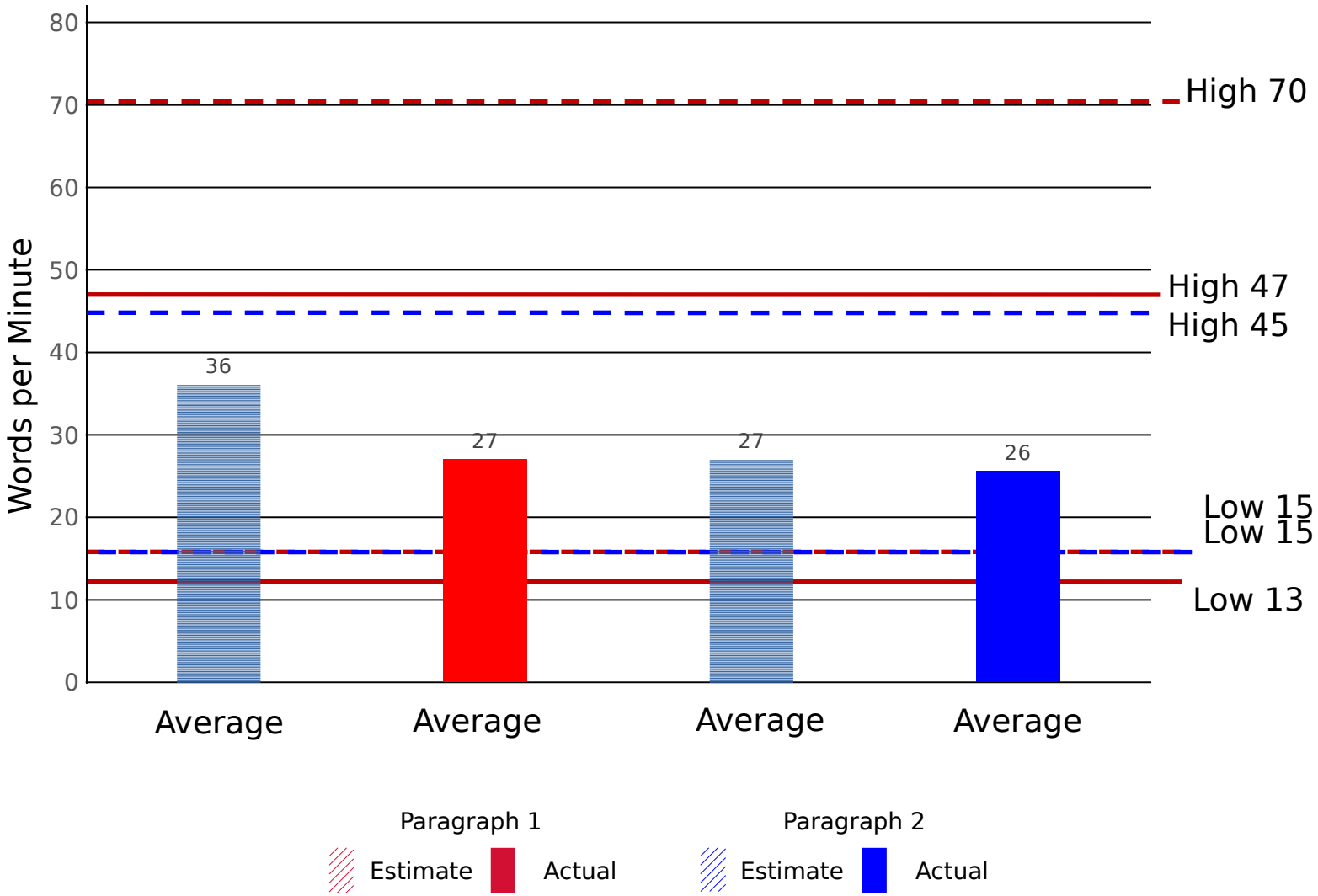
Results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Low 15
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27
26
Average
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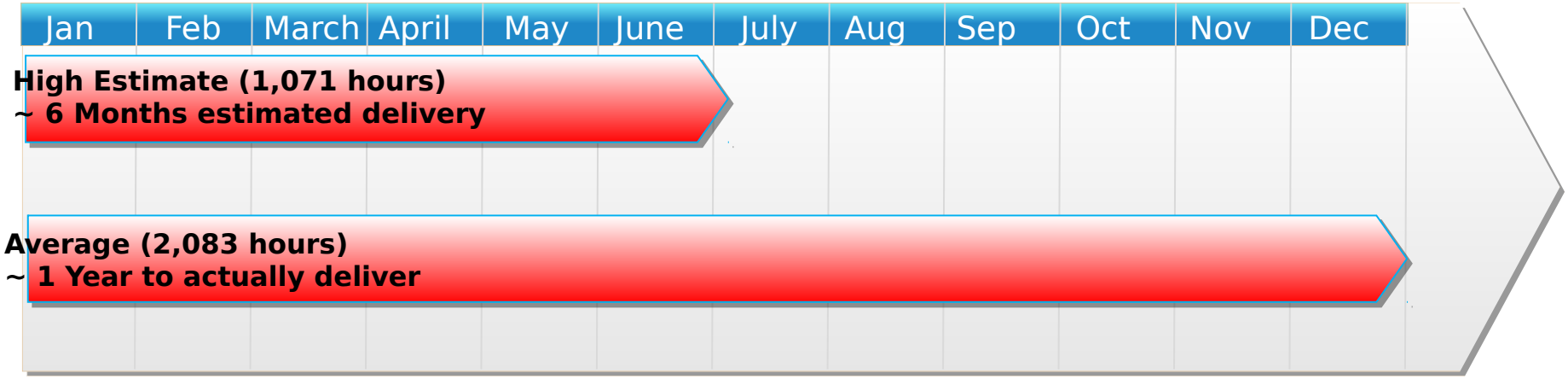
Average
Paragraph 1
Estimate
Actual
Paragraph 2
Estimate
Actual

What If…

- **You estimate using the high (70) estimate but the team performs at the average (36) rate**
  - **High: 75,000 Words / 70 WPM = 1,071 Minutes**

Hours

Hours



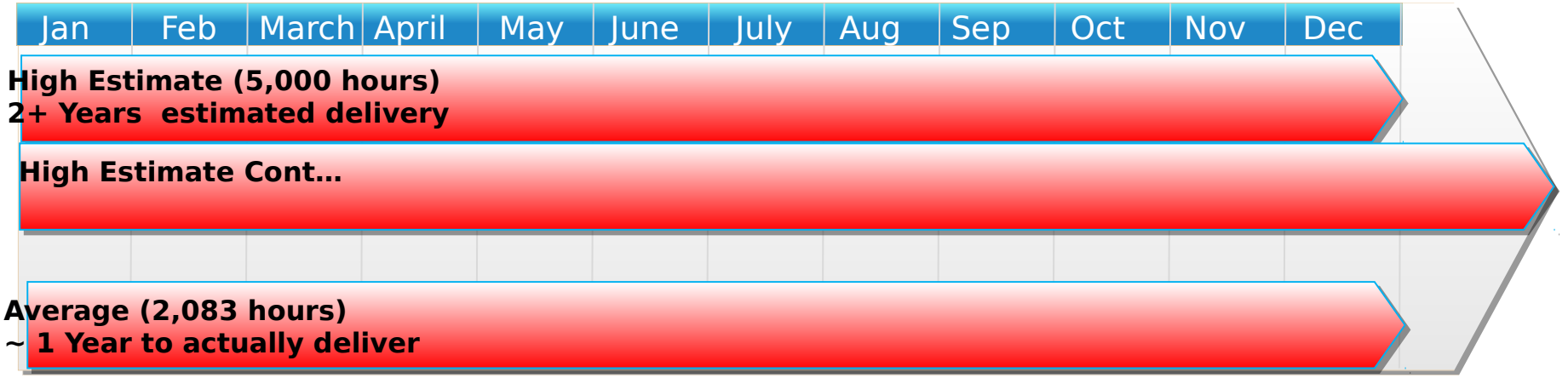
WPM = Words-per-minute

Or What If…

- **You estimate using the Low (15) estimate but the team performs at the average (36) rate**
  - **Low: 75,000 Words / 15 WPM = 5,000 Minutes**

Hours

Hours



WPM = Words-per-minute

Project Variables

- Cost
- Schedule (Tim
- Quality
- Capability

Cost

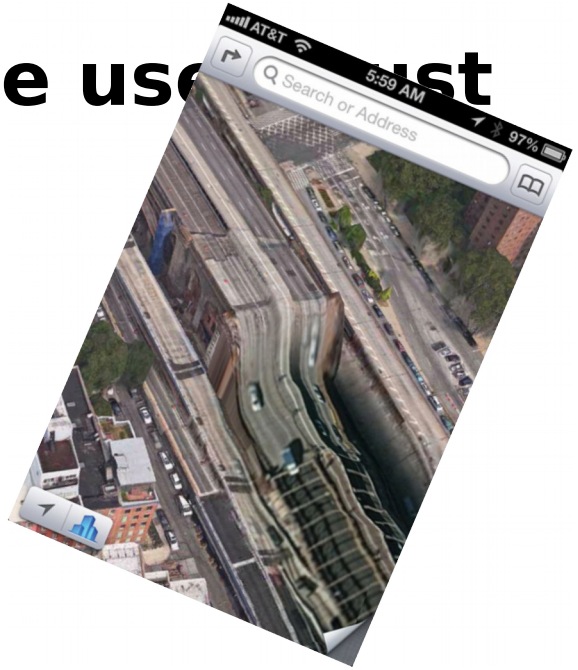
- **Typically tied to schedule (see Schedule) but not always:**
  - **Material cost (I.e., Titanium vs stainless steel)**
  - **Increased / decreased performance (hardware)**
  - **Etc…**

Schedule (Time)

- **Long project schedules or schedule delays may cause additional schedule delays or an obsolete product since:**
  - **User needs change**
    - **Causing additional requirements late in the process to address these changes -> adding to the schedule**
  - **Technology changes**
    - **May require hardware changes adding to the schedule**

Quality

- **Pay me now… Or pay me later…**
  - **Increased cost to repair later in development**
  - **Increase in support costs (Help Desk)**
  - **Increase in user dissatisfaction**



Capability

- **Decreased user trust**

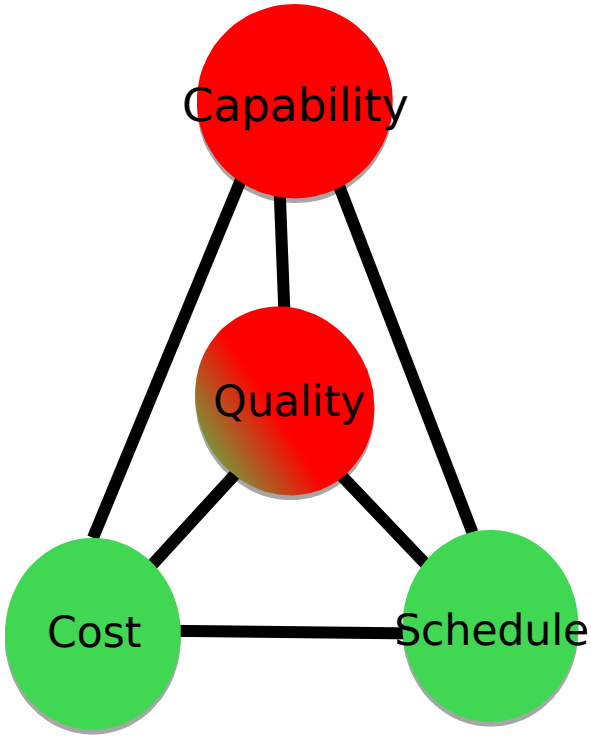
Project Variables

- Cost
- Schedule (Time)
- Quality
- Capability

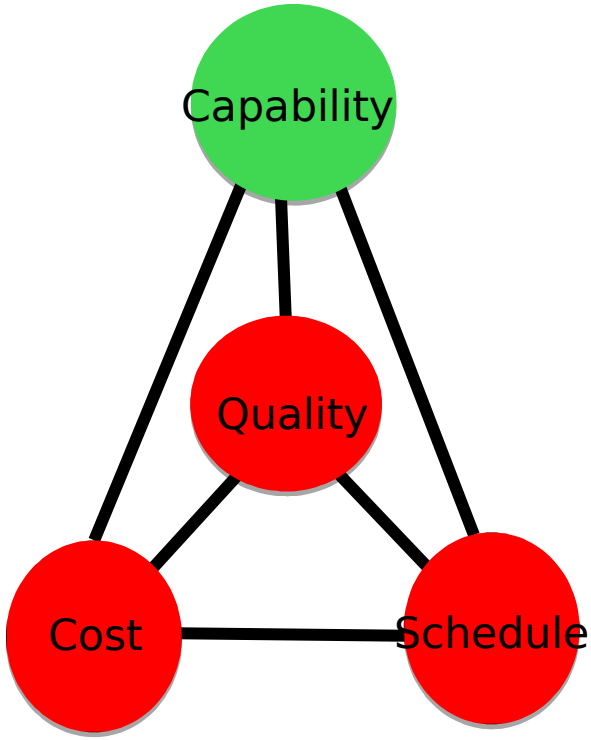
WHICH VARIABLES DO WE ALLOW TO CHANGE?

Project Variables

Traditional



Agile



= Fixed = **Floating**

Organizational Structure

Learn. Perform. Succeed.

Aspects of Product Development

- **Business Aspect**
  - **Responsible for the overall acquisition: contracting, funding, operational requirements, and system delivery structure**
- **Project / System Aspect**
  - **Overall technical management. Further decompose the requirements and allocate them to software or hardware**
- **Development Aspect**
  - **Developmental items**

Different Focus – Same Goal

Op. Requirements

Strategic Goals
Contracts
Funding

Business Aspect

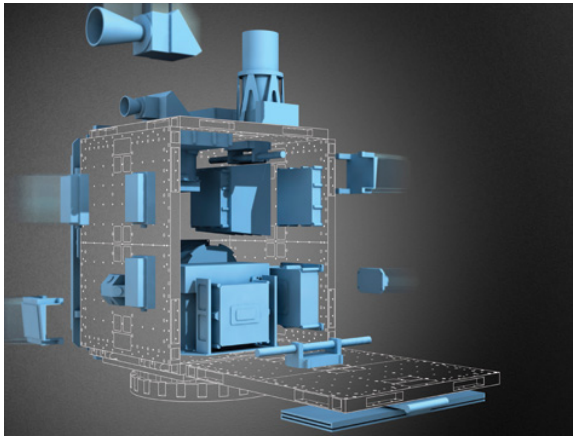
Tech. Requirements

Project Planning
Systems Planning
Technical Standards
Integration

Project / System Aspect

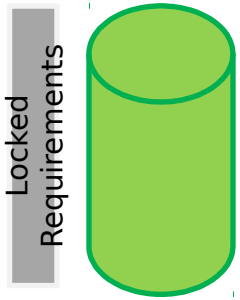
Development Aspect

Development Test



Traditional Requirements Management

Business Aspect

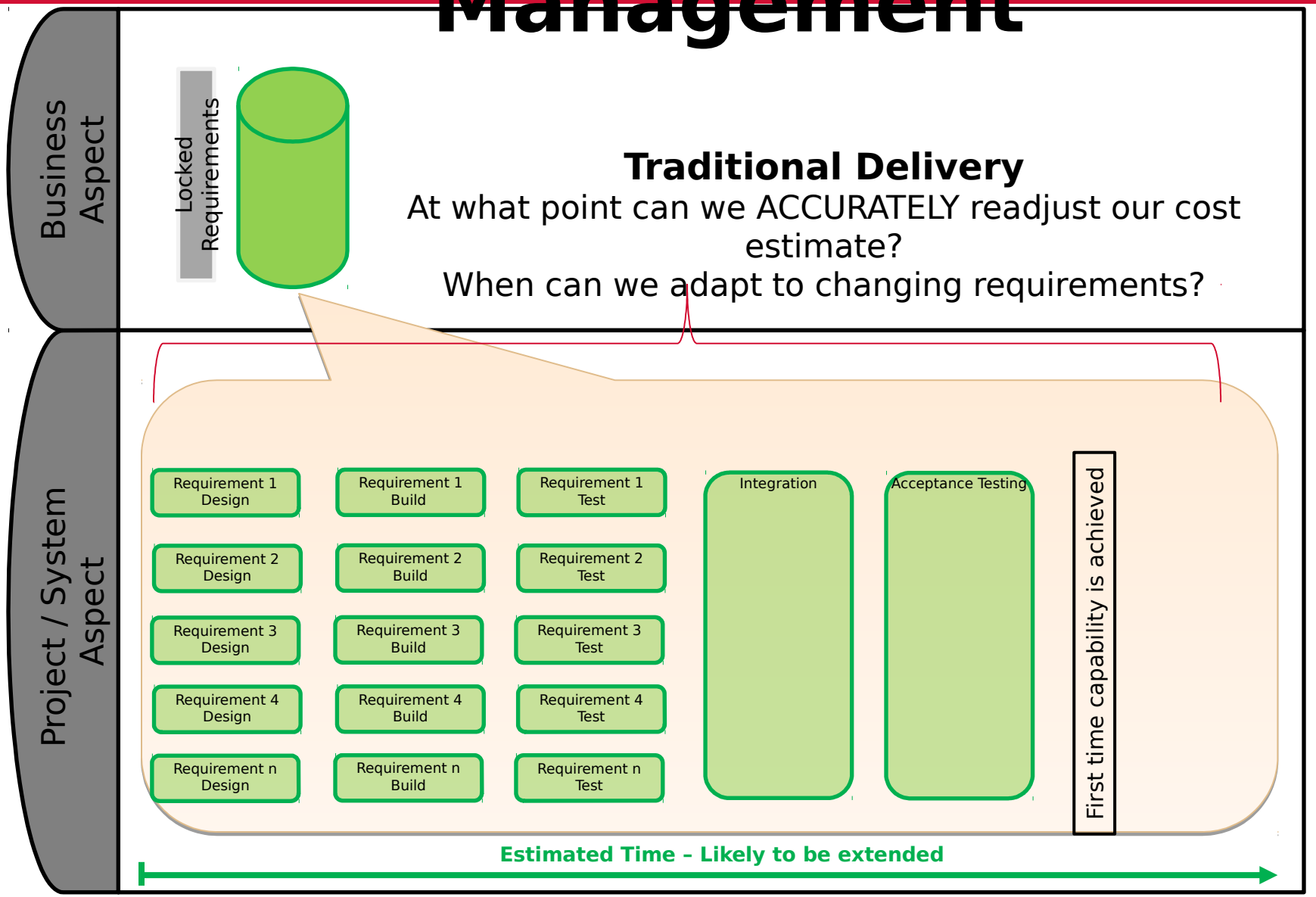


Project / System Aspect

How long (time) will it take to complete these requirements?

How much will it cost to complete these requirements?

Traditional Requirements Management



Using What We Know

- **We can't get everything done [Prioritization]**
- **Time is a critical factor [Time Boxing / Short Time-lines]**

Agile Practices

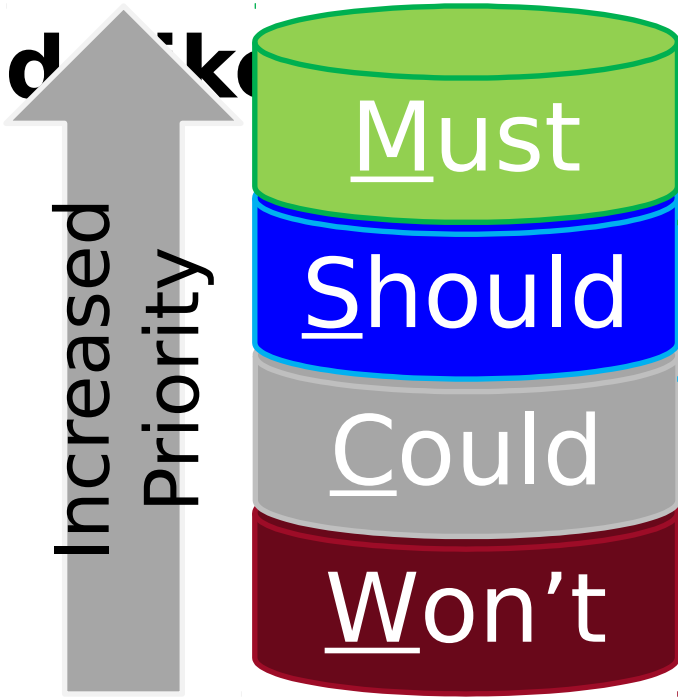
Incremental Development	**Small Teams**
Iterative Development	**Time Boxing**
Short Time-lines	**Lean Initiatives**
Retrospectives (Lessons learned)	**Prototyping**
Empowered / Self-organizing / Managing teams	**Continuous User Involvement**
Prioritized Product Backlog (Requirements)	**Co-located Teams**

How do we Prioritize Enterprise Requirements?

- Numerically?
- Relative to each other?
- Groups?

MoSCoW* (Groups)

- Must Have (or Minimum Usable Subset)
- Should Have
- Could Have
- Won't Have (but Would Like in Future)

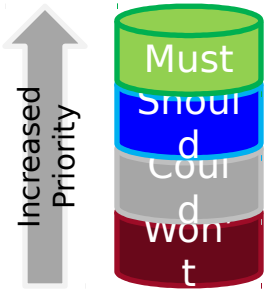


* Used in Dynamic Systems Development Method

Agile Requirements Management

Business Aspect

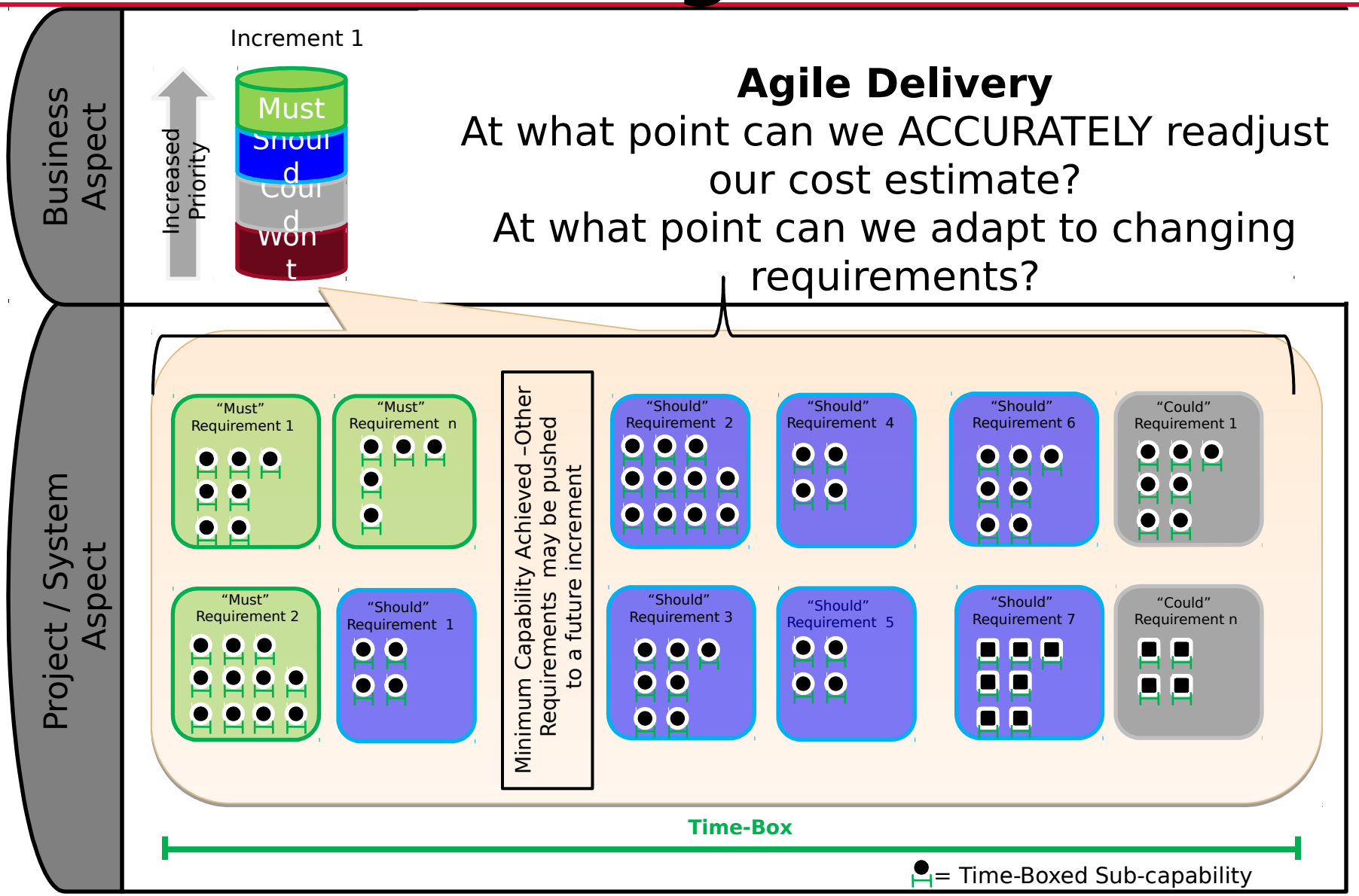
Increment 1



Project / System Aspect

Given this priority, budget and time what capability can be completed?

Agile Requirements Management



Requirements Must Have A…

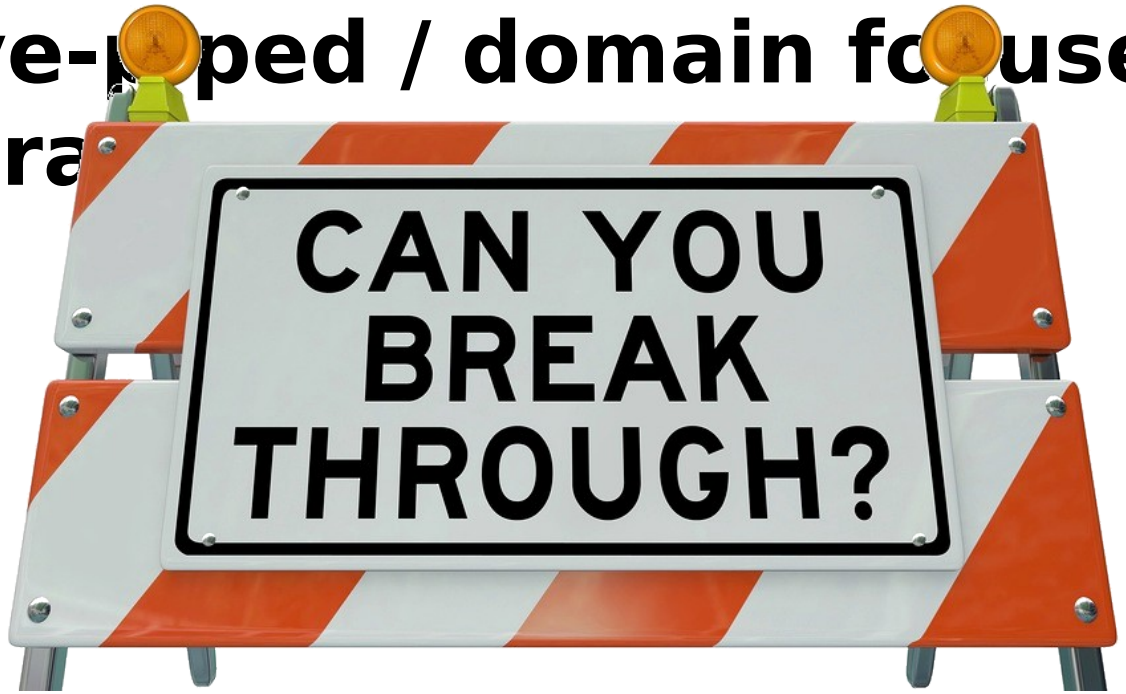
- Specified level of Testable Quality (Acceptance criteria)
- Priority (Must, Should, Could, Won’t)
  - Everything CAN’T be a MUST!
- Estimated Level of Effort (time-boxed period to con requirement)

To the Maximum Extent Possible Requirements…

- Must be developed in priority order
- Must meet the minimum level of predefined acceptable quality and no more
- Must be estimated by t developers performing

Cultural Barriers

- **Pushed capability vs. added time / $$**
- **Multidisciplinary teams vs. domain focused teams**
- **Stove-piped / domain focused contra**



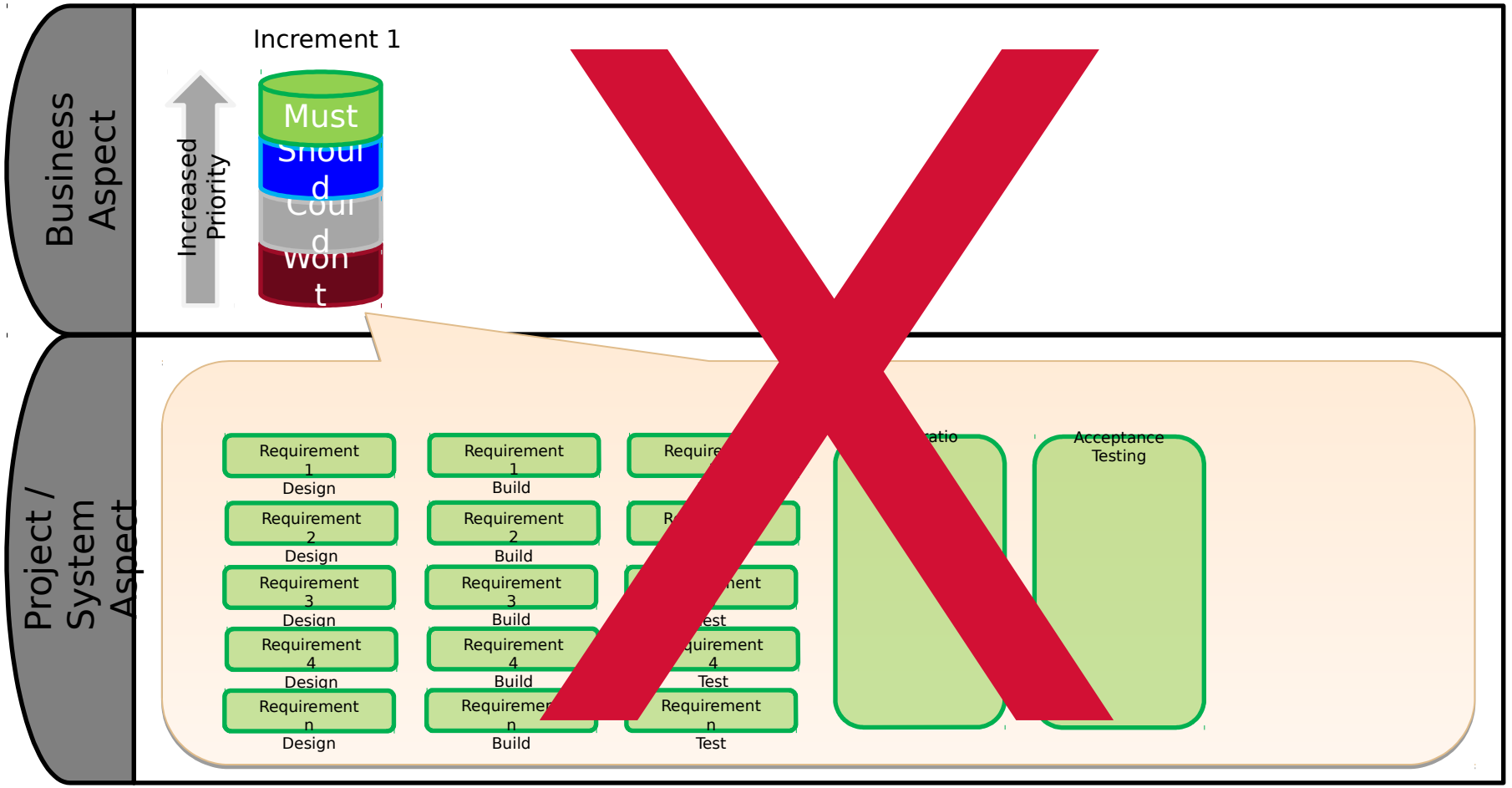
More Tools to Manage Risk

- **Specify SHORT delivery times**
  - **Generally, the longer the deliver time the greater the risk**
- **Prioritize the requirements**
  - **Ensure high priority requirements get completed first**
- **Working capabilities are the only measure of success**

Fragile vs. Agile

FRAGILE	AGILE
Adding Time / Adding Money to a troubled project	Pushed capability to the next increment
Domain focused teams	Multidisciplinary teams
Long / single deliveries	Short / incremental deliveries
Non-standard / monolithic design	Standard / Modular design
Requirements change throughout development	Requirements change between increments
Long static contracts	Streamlined contracting process

Agile Requirements with Traditional Project Management

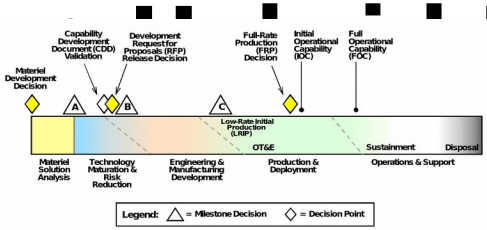


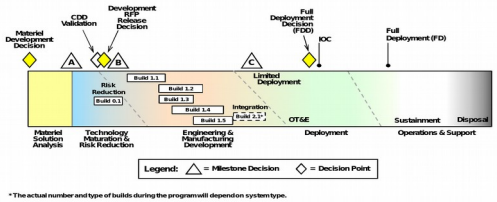
The DoD's Support for Agile

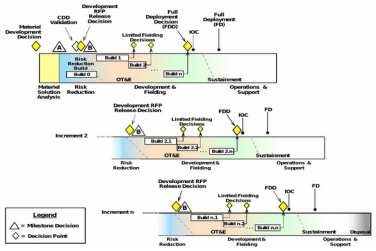
Learn. Perform. Succeed.

Interim 5000.02 From 1 to 6 Acquisition Models

- **Model 1: Hardware Intensive Program**
- **Model 2: Defense Unique Software Intensive Program**
- **Model 3: Incrementally Fielded Software Intensive Program**
- **Model 4: Accelerated Acquisition Program**
- **Hybrid Program A (Hardware Intensive) and**







Interim 5000.02 Process Flexibility

- The structure of a DoD acquisition program and the procedures used should be tailored as much as possible to the characteristics of the product being acquired, and to the totality of circumstances associated with the program including operational urgency and risk factors.
- Authorizes Milestone Decision Authorities (MDAs) to tailor the regulatory requirements and acquisition procedures in this instruction to more efficiently achieve program objectives, consistent with statutory requirements and DoD Directive 5000.01
- MDAs will tailor program strategies and oversight, including program information, acquisition phase content, the timing and scope of decision reviews and decision levels, based on the specifics of the product being acquired, including complexity, risk factors, and required timelines to satisfy validated capability requirements
- Statutory requirements will be complied with, unless waived in accordance with relevant provisions

DoD CIO IT Modernization

CONSOLIDATE INFRASTRUCTURE

1. Consolidate Enterprise Networks
2. Deliver DoD Enterprise Cloud
3. Standardize IT Platforms

STREAMLINE PROCESSES

4. Enable Agile IT
5. Strengthen IT Governance
6. Strategic Sourcing for IT Commodities
7. Strengthen Cyber Security
8. Strengthen IT Investments
9. Improve Enterprise Arch Effectiveness

STRENGTHEN WORKFORCE

10. Modernize IT Guidance and Training

4. Enabling Agile IT

Deliver usable capabilities to users every 6-12 months

Active user involvement to prioritize requirements and provide responsive feedback during development

A different approach to project management - Small, dynamic, and empowered teams

Roadmaps and architectures align agile increments into larger capabilities

Small scoped releases **responsive to changes** in ops, tech, budget...

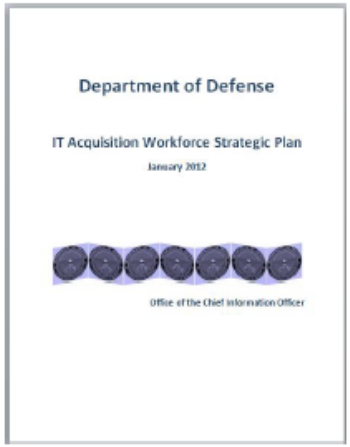
Streamlined contracting processes leveraging existing contract vehicles for rapid Task/Delivery Order execution

Leveraging **common infrastructure platforms**, standards, and interfaces

Integrated test and evaluation, certifications during development leveraging common test infrastructure, automated tools

10. Modernize IT Guidance and Training

Modernize IT Acquisition Education and Training



Implement DoD IT Acquisition Workforce Strategic Plan

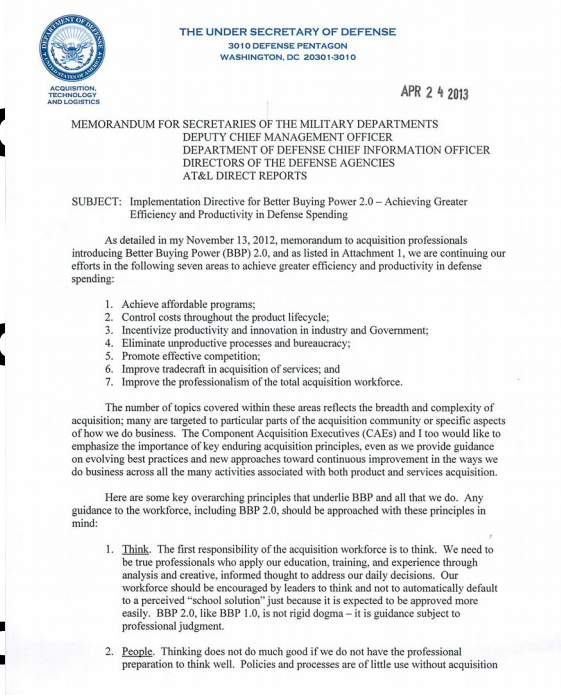
Develop Career Roadmaps For IT Acquisition Personnel

Guide Adoption of Agile IT Practices

Create robust IT Acquisition Communities

Better Buying Power 2.0

- **Reflects the Department of Defense's commitment to continuous improvement in acquisition performance**
- **Encompasses a set of fundamental acquisitio principles to achieve:**
  - **Greater efficiencies thro affordability**
  - **Cost control**
  - **Elimination of unproduc**



THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
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ACQUISITION, TECHNOLOGY AND LOGISTICS

APR 2 4 2013

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
DEPUTY CHIEF MANAGEMENT OFFICER
DEPARTMENT OF DEFENSE CHIEF INFORMATION OFFICER
DIRECTORS OF THE DEFENSE AGENCIES
AT&L DIRECT REPORTS

SUBJECT: Implementation Directive for Better Buying Power 2.0 – Achieving Greater Efficiency and Productivity in Defense Spending

As detailed in my November 13, 2012, memorandum to acquisition professionals introducing Better Buying Power (BBP) 2.0, and as listed in Attachment 1, we are continuing our efforts in the following seven areas to achieve greater efficiency and productivity in defense spending:

1. Achieve affordable programs;
2. Control costs throughout the product lifecycle;
3. Incentivize productivity and innovation in industry and Government;
4. Eliminate unproductive processes and bureaucracy;
5. Promote effective competition;
6. Improve tradecraft in acquisition of services; and
7. Improve the professionalism of the total acquisition workforce.

The number of topics covered within these areas reflects the breadth and complexity of acquisition; many are targeted to particular parts of the acquisition community or specific aspects of how we do business. The Component Acquisition Executives (CAEs) and I too would like to emphasize the importance of key enduring acquisition principles, even as we provide guidance on evolving best practices and new approaches toward continuous improvement in the ways we do business across all the many activities associated with both product and services acquisition.

Here are some key overarching principles that underlie BBP and all that we do. Any guidance to the workforce, including BBP 2.0, should be approached with these principles in mind:

1. Think. The first responsibility of the acquisition workforce is to think. We need to be true professionals who apply our education, training, and experience through analysis and creative, informed thought to address our daily decisions. Our workforce should be encouraged by leaders to think and not to automatically default to a perceived "school solution" just because it is expected to be approved more easily. BBP 2.0, like BBP 1.0, is not rigid dogma – it is guidance subject to professional judgment.

2. People. Thinking does not do much good if we do not have the professional preparation to think well. Policies and processes are of little use without acquisition

Better Buying Power 2.0 and Agile Practices

Achieve Affordable Programs

- ✓ Mandate affordability as a requirement
- Institute a system of investment planning to derive affordability caps
- Enforce affordability caps

Control Costs throughout the Product Life Cycle

- Implement "should cost" based management
- Eliminate redundancy within warfighter portfolios
- Institute a system to measure the cost performance of programs and institutions and to assess the effectiveness of acquisition policies
- ✓ Build stronger partnerships with the requirements community to control costs
- Increase the incorporation of defense exportability features in initial designs

Incentivize Productivity & Innovation in Industry and Government

- Align profitability more tightly with Department goals
- ✓ Employ appropriate contract types
- Increase use of Fixed Price Incentive contracts in Low Rate Initial Production
- Better define value in "best value" competitions
- When LPTA is used, define Technically Acceptable to ensure needed quality

Promote Effective Competition

- ✓ Emphasize competition strategies and creating and maintaining competitive environments
- ✓ Enforce open system architectures and effectively manage technical data rights
- Increase small business roles and opportunities
- Use the Technology Development phase for true risk reduction

Improve Tradecraft in Acquisition of Services

- Assign senior managers for acquisition of services
- Adopt uniform services market segmentation
- Improve requirements definition/prevent requirements creep
- Increase use of market research
- Increase small business participation
- Strengthen contract management outside the normal acquisition chain—installations, etc.
- ✓ Expand use of requirements review boards and tripwires

Improve the Professionalism of the Total Acquisition Workforce

Final Thought

- **There are NO extra-ordinary programs…. Just programs that do ORDINARY things better!**

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